

AMENDMENTS TO THE DRAWINGS:

FIG. 1 has been amended as shown in the marked-up copy of FIG. 1. A replacement sheet depicting FIG. 1, as amended, is included with this amendment. The dotted arrows have been deleted and replaced with solid arrows pointing between step 105 and step 108, step 108 and step 106, step 105 and step 109, and step 109 and step 106, respectively. The phrase "reaction with analyte to produce" has been included in step 106 before the phrase "analyte labeled with heterodiamondoid probe."

REMARKS

Status of the Claims

Claims 29-40 are pending, with claim 23 being the only independent claim presently pending. Claims 1-28 have been cancelled as being directed to non-elected subject matter pursuant to the restriction requirement dated October 10, 2006 without prejudice to or disclaimer of the subject matter contained therein. Applicants expressly reserve the right to file one or more divisional applications directed to the non-elected subject matter. Claims 30-38 have been amended to even more clearly recite an aspect of the present invention. Support for the claim amendments can be found throughout the specification and claims. As such, no new matter has been added.

Applicants respectfully request the Examiner to reconsider and withdraw the outstanding rejections in view of the foregoing amendments and the following remarks.

Information Disclosure Statement

The information disclosure statements filed 12 July 2004 and 4 January 2005 are indicated as failing to comply with the provisions of 37 CFR § 1.98(b)(5) due to incomplete citations for many of the publications. Applicants have corrected the 1449s and are resubmitting the IDS with these corrected 1449s herewith.

Applicants thank the Examiner for indicating that copies of the cited publications and articles that were previously submitted were not required with re-submission of the IDS. Accordingly, copies of the listed documents submitted with the Information Disclosure Statements filed on 30 December 2004 and 2 July 2004 are not submitted herewith because they were submitted with the original filings and are imaged in PAIR. The three cited documents not previously submitted are enclosed herewith.

Applicants request the Examiner to contact the undersigned if there are any citations that require further correction or if there are any articles or publications for which a copy is needed.

Objections to the Specification

The disclosure has been objected to for minor informalities. The disclosure has been amended herein to address the objections. Accordingly, Applicants respectfully request that the objections to the specification be withdrawn.

Objections to the Drawings

The drawings have been objected to under 37 C.F.R. 1.83(a). More specifically, the Examiner sets forth that FIG. 1 fails to show "step 106" as described in the specification at page 10, line 14; FIG. 11A fails to show "self-assembled or crystallized material 1100" as described in the specification at page 29, line 23; FIG. 11B fails to show "molecular crystal 1101" as described in the specification at page 30, line 12; reference character "1001" is used to designate both "diamondoid-containing material" and "molecular crystal"; and FIG. 1 is further objected to because of the underlined symbol shown at page 4 of the Office Action.

FIG. 1 has been amended as shown in the marked-up copy of FIG. 1. A replacement sheet depicting FIG. 1, as amended, is included with this amendment. The dotted arrows have been deleted and replaced with solid arrows pointing between step 105 and step 108, step 108 and step 106, step 105 and step 109, and step 109 and step 106, respectively. The phrase "reaction with analyte to produce" has been included in step 106 before the phrase "analyte labeled with heterodiamondoid probe."

Further, the specification has been amended to overcome the objections to FIG. 11A and FIG. 11B.

Accordingly, Applicants respectfully submit that the objections to the drawings be withdrawn.

Claim Rejection under 35 U.S.C. § 112

Claims 29, 37, and 28 are rejected under 35 U.S.C. § 112, second paragraph as being indefinite. Applicants assume that the Examiner intended to reject claim 38 and not claim 28 as claim 28 was withdrawn from consideration. Accordingly, Applicants address the indefiniteness rejection of claims 29, 37, and 38 hereinbelow. Applicants respectfully disagree with the rejection; therefore, this rejection is respectfully traversed.

Specifically, the Examiner alleges that the term "heterodiamondoid" is indefinite and that the identity of one or more member structures belonging to the class "heterodiamondoid"

is not clear. The Examiner goes on to state that it is not clear whether/how a "heterodiamondoid" possesses a "diamond lattice". The Examiner further alleges that how an atom is "folded into" a diamond lattice is not clear. It is further alleged that the identity of one or more objects and/or steps required for making or providing a diamond lattice having an atom "folded into" the diamond lattice is not clear.

Applicants respectfully disagree with the Examiner's position and submit that the term "heterodiamondoid" is explicitly defined in the specification and is well understood to a skilled artisan. At page 15, lines 19-25 of the specification, it is provided that "[t]he term 'heterodiamondoid' as used herein refers to a diamondoid that contains a heteroatom typically substitutionally positioned on a lattice site of the diamond crystal structure...'Substitutionally positioned' means that the heteroatom has replaced a carbon host atom in the diamond lattice. Although most heteroatoms are substitutionally positioned, they may in some cases be found in interstitial sites as well." Furthermore, the specification provides exemplary synthesis of heterodiamondoids at page 15, lines 35 to page 17, line 34. Moreover, at page 18, lines 8-10, the specification refers to Chevron's earlier filed U.S. Application Serial No. 10/622,130 entitled "Heterodiamondoids", now U.S. Patent No. 7,049,374, for additional information regarding heterodiamondoids.

Accordingly, for at least the above-reasons, Applicants respectfully withdrawal of the § 112, second paragraph, rejection is respectfully requested.

Claims 30-34 are rejected under 35 U.S.C. § 112, second paragraph as being indefinite. Specifically, the Examiner has alleges that the phrase "the luminescent event" lacks antecedent basis. Without conceding the propriety of the rejection, claims 30-34 have been amended to recite "luminescence" instead of "luminescent event" in order to expedite prosecution.

Accordingly, withdrawal of the § 112, second paragraph, rejection is respectfully requested.

Claim 35 is rejected under 35 U.S.C. § 112, second paragraph as being indefinite. Specifically, the Examiner alleges that the essential cooperative relationship between "diamondoid lattice" and "diamondoid lattice site" is not clear and appears omitted from the claim, the essential cooperative relationship between "diamondoid lattice site" and "vacancy

or pore" is not clear and appears omitted from the claim, and the term "substitutionally" is indefinite. Without conceding the propriety of the rejection and merely in order to expedite prosecution, claim 35 has been amended to recite "the heterodiamondoid-containing probe comprises at least one diamondoid comprising a diamondoid lattice having multiple diamondoid lattice sites, each of the diamondoid lattice sites containing a carbon atom, and at least one vacancy or pore, and further wherein step a) includes replacing the carbon atom at one of the diamondoid lattice sites with a nitrogen heteroatom, wherein the replacement occurs at the diamondoid lattice site adjacent to the at least one vacancy or pore".

Accordingly, withdrawal of the § 112, second paragraph, rejection is respectfully requested.

Claim 36 is rejected under 35 U.S.C. § 112, second paragraph as being indefinite. Specifically, the Examiner alleges that the phrases "the diamondoid-containing material," "the bandgap," and the "bandgap of the diamondoid-containing material" lack antecedent basis and the infinitive "to create" is indefinite. Without conceding the propriety of the rejection and merely in order to expedite prosecution, claim 36 has been amended to recite the heterodiamondoid-containing probe comprises a diamondoid-containing material having a bandgap and further including the step of positioning impurity atoms within the diamondoid-containing material creating electronic states within the bandgap of the diamondoid-containing material".

Accordingly, withdrawal of the § 112, second paragraph, rejection is respectfully requested.

Claim 37 is rejected under 35 U.S.C. § 112, second paragraph as being indefinite. Specifically, the Examiner alleges that the term "after" is indefinite. Without conceding the propriety of the rejection and merely in order to expedite prosecution, claim 37 has been amended to clarify that the step of passing the biological label through a cell membrane occurs after step b) of binding the heterodiamondoid-containing probe to the target analyte.

As such, withdrawal of the 35 U.S.C. §112, second paragraph, rejection is respectfully requested.

Claim 38 is rejected under 35 U.S.C. § 112, second paragraph as being indefinite. Specifically, the Examiner alleges that it is unclear whether the step of "reacting" in claim 38 references the step of "binding" in claim 29. Without conceding the propriety of the rejection and merely in order to expedite prosecution, claim 38 has been amended to clarify that the step of passing the heterodiamondoid-containing probe through a cell membrane occurs before step b) of binding the heterodiamondoid-containing probe to the target analyte.

Accordingly, withdrawal of the 35 U.S.C. §112, second paragraph, rejection is respectfully requested.

Claim Rejection under 35 U.S.C. § 102

Claims 29-40 have been rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,032,381 (*Bronstein & Voyta*). Applicants respectfully disagree with the rejection; therefore, this rejection is respectfully traversed.

According to M.P.E.P. § 2131, "a claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

Bronstein & Voyta disclose chemiluminescent compounds that are enzymatically-cleavable 1,2-dioxetanes of formula (I). (Col. 7, lines 9- 18). Formula (II) depicts a preferred enzymatically-cleavable 1,2-dioxetane including an adamantyl group. (Col. 9, lines 24-36). The Z substituent of formula (I) is cleavable by an enzyme to yield an electron-rich moiety bonded to the fluorophore Y ring. Col. 7, lines 58-68. When an enzyme cleaves the Z substituent, the Y substituent reaches an excited energy state and emits electromagnetic radiation, preferably luminescence of visible light, to return to its original energy state. (Col. 7, lines 53-57, col. 10, lines 67-col. 11, line 4). The enzyme can be attached to a cell by the use of suitable ligands, such as an antibodies specific for cellular receptors. (Col. 11, lines 5-28).

In contrast, the presently claimed invention recites binding a heterodiamondoid-containing probe to a target analyte, thus creating a biological label and exciting the biological label with energy such that the ***biological label is caused to luminesce***. As claimed and as further explained in the specification, the heterodiamondoid-containing probe/target analyte complex luminesces so that the light emitted can be detected and the

target analyte can be detected/measured. Accordingly, the heterodiamondoid itself is functionalized to create a heterodiamondoid probe that will bind to an analyte of interest and luminesce when excited. As presently claimed, it is not the cleaving of a functional group from the diamondoid backbone that causes luminescence.

Bronstein & Voyta do not disclose or suggest providing a heterodiamondoid-containing probe; binding the heterodiamondoid-containing probe to the target analyte, thus creating a biological label; exciting the biological label with energy such that the biological label is caused to luminesce; and detecting light emitted from the excited biological label.

As disclosed in *Bronstein & Voyta*, the 1,2 dioxetane of Formula (II) is not a heterodiamondoid-containing probe. A heterodiamondoid is a diamondoid that contains a heteroatom, an atom other than carbon, either at a lattice site or in an interstitial site. Formula (II) contains adamantyl, which is a diamondoid, but not a heterodiamondoid. Adamantyl is bonded to other atoms and chemical groups, but does not contain a heteroatom with its lattice. *Bronstein & Voyta* gives no indication that a heteroatom may be present in adamantyl. Thus, *Bronstein & Voyta* neither disclose nor suggest a heterodiamondoid-containing probe.

Further, the chemiluminescent compound of *Bronstein & Voyta* does not experience binding with a target analyte. Rather, the chemiluminescent compound is exposed to an enzyme, which cleaves the Z substituent. The enzyme can be attached to a cell or other particulate to be measured, but the chemiluminescent compound is not so attached. The chemiluminescent compound only experiences cleavage, and it is this cleavage that causes the chemiluminescence. Thus, *Bronstein & Voyta* neither disclose nor suggest binding the heterodiamondoid probe to the target analyte, thus creating a biological label.

For at least the above reasons, Applicants respectfully submit that *Bronstein & Voyta* fails to anticipate claims 29-40. Accordingly, withdrawal of the above §102(b) rejection is respectfully requested.

Claims 29-36 stand rejected 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,514,717 (*Bronstein*). Applicants respectfully disagree with the rejection; therefore, this rejection is respectfully traversed.

Bronstein discloses a kit for conducting an assay to detect a substance using enzymatically-induced decomposition of dioxetanes. In particular, *Bronstein* discloses

reacting an enzyme with a dioxetane having the formula set forth at col. 1, lines 35-40. The T group of the dioxetane may be adamantyl. (Col. 2, lines 19-20). Contact of the dioxetane with the enzyme cleaves group Z, excites group Y, and causes group Y to luminesce. The enzyme is bound to a detectable substance through a substance having a specific affinity for the detectable substance. Thus, the luminescence indicates that the detectable substance is present and luminescence intensity can be measured to determine the concentration of the detectable substance. Col. 11, lines 30-47.

However, as described above with regard to *Bronstein & Voyta*, *Bronstein* does not disclose or suggest providing a heterodiamondoid-containing probe; binding the heterodiamondoid-containing probe to the target analyte, thus creating a biological label; exciting the biological label with energy such that the biological label is caused to luminesce; and detecting light emitted from the excited biological label.

As disclosed in *Bronstein*, the dioxetane having the formula set forth at col. 1, lines 35-40 is not a heterodiamondoid containing probe. While group T may be adamantyl, *Bronstein* does not disclose or suggest that a heteroatom may be present in adamantyl. Instead, *Bronstein* states that "[t]he most preferred molecule is an adamantyl group consisting of 3 fused cyclohexyl rings." Adamantyl is bonded to other atoms and chemical groups, but does not contain a heteroatom with its lattice. Thus, *Bronstein* neither discloses nor suggests a heterodiamondoid-containing probe.

Further, the dioxetane of *Bronstein* does not experience binding with a target analyte. Rather, the dioxetane is exposed to an enzyme, which cleaves the Z substituent. The enzyme can be attached to a detectable substance by means of a specific affinity substance, but the dioxetane is not so attached. The dioxetane only experiences cleavage, and it is this cleavage that causes the chemiluminescence. Thus, *Bronstein* neither discloses nor suggests binding the heterodiamondoid probe to the target analyte, thus creating a biological label.

For at least the above reasons, Applicants respectfully submit that *Bronstein* fails to anticipate claims 29-36. Accordingly, withdrawal of the above §102(b) rejection is respectfully requested.

Claim Rejection Under 35 U.S.C. § 103

Claims 29-38 stand rejected under 35 U.S.C. § 103(a) as being obvious over U.S. Patent No. 7,070,921 (*Huang et al.*) in view of *Bronstein*. Applicants respectfully disagree with the rejection; therefore, this rejection is respectfully traversed.

M.P.E.P. § 2142 provides that to establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure.

Huang et al. discloses assays for detecting molecular modifications such as phosphate modifications and the presence and/or activity of enzymes and other agents involved in facilitating or otherwise regulating such modifications. (Abstract). *Huang et al.* discloses species and/or reactions that may be analyzed using assays. The species include reactant and product A and A*, respectively. (Col. 10, lines 51-54). A and A* generally comprise any two species related by a modification. (Col. 11, lines 1-2). A and/or A* may include components intended to facilitate detection of binding between A or A* and binding partner, such as a luminophore. (Col. 11, lines 15-18).

The Examiner acknowledges that *Huang et al.* does not describe a heterodiamondoid-containing probe. See Office Action at page 9. *Bronstein* has been cited as disclosing a heterodiamondoid-containing probe.

As described above, *Bronstein* discloses a kit for conducting an assay to detect a substance using enzymatically-induced decomposition of dioxetanes. In particular, *Bronstein* discloses reacting an enzyme with a dioxetane having the formula set forth at col. 1, lines 35-40. The T group of the dioxetane may be adamantyl. (Col. 2, lines 19-20). Contact of the dioxetane with the enzyme cleaves group Z, excites group Y, and causes group Y to luminesce.

However, as described above with regard to *Bronstein & Voyta*, *Bronstein* does not disclose or suggest providing a heterodiamondoid-containing probe; binding the heterodiamondoid-containing probe to the target analyte, thus creating a biological label;

exciting the biological label with energy such that the biological label is caused to luminesce; and detecting light emitted from the excited biological label.

As disclosed in *Bronstein*, the dioxane having the formula set forth at col. 1, lines 35-40 is not a heterodiamondoid containing probe. While group T may be adamantyl, *Bronstein* does not disclose or suggest that a heteroatom may be present in adamantyl. Instead, *Bronstein* states that "[t]he most preferred molecule is an adamantyl group consisting of 3 fused cyclohexyl rings." Adamantyl is bonded to other atoms and chemical groups, but does not contain a heteroatom with its lattice. Thus, *Bronstein* neither discloses nor suggests a heterodiamondoid-containing probe.

Further, the dioxane of *Bronstein* does not experience binding with a target analyte. Rather, the dioxane is exposed to an enzyme, which cleaves the Z substituent. The enzyme can be attached to a detectable substance by means of a specific affinity substance, but the dioxane is not so attached. The dioxane only experiences cleavage, and it is this cleavage that causes the chemiluminescence. Thus, *Bronstein* neither discloses nor suggests binding the heterodiamondoid probe to the target analyte, thus creating a biological label.

Accordingly, Applicant respectfully submits that even if there were some suggestion or motivation to combine *Huang et al.* and *Bronstein* and a reasonable expectation of success, *Huang et al.* and *Bronstein*, even when combined, do not disclose or suggest all the claim limitations. Even if combined, *Huang et al.* and *Bronstein* do not disclose or suggest a method of detecting a target analyte comprising providing a heterodiamondoid-containing probe. In addition, even if combined, *Huang et al.* and *Bronstein* do not disclose or suggest binding the heterodiamondoid-containing probe to the target analyte, thus creating a biological label; exciting the biological label with energy such that the biological label is caused to luminesce; and detecting light emitted from the excited biological label. Therefore, Applicants respectfully submit that *Huang et al.* and *Bronstein*, even if combined, fail to disclose or suggest all the features recited in independent claim 29.

Thus, for at least the above-noted reasons, Applicant respectfully requests that the obviousness rejection of claims 29-38 over *Huang et al.* and *Bronstein* be withdrawn.

Conclusion

For the reasons noted above, the art of record does not disclose or suggest the inventive concept of the present invention as defined by the claims.

In view of the foregoing amendments and remarks, reconsideration of the claims and allowance of the subject application is earnestly solicited. In the event that there are any questions relating to this application, it would be appreciated if the Examiner would telephone the undersigned attorney concerning such questions so that prosecution of this application may be expedited.

Respectfully submitted,

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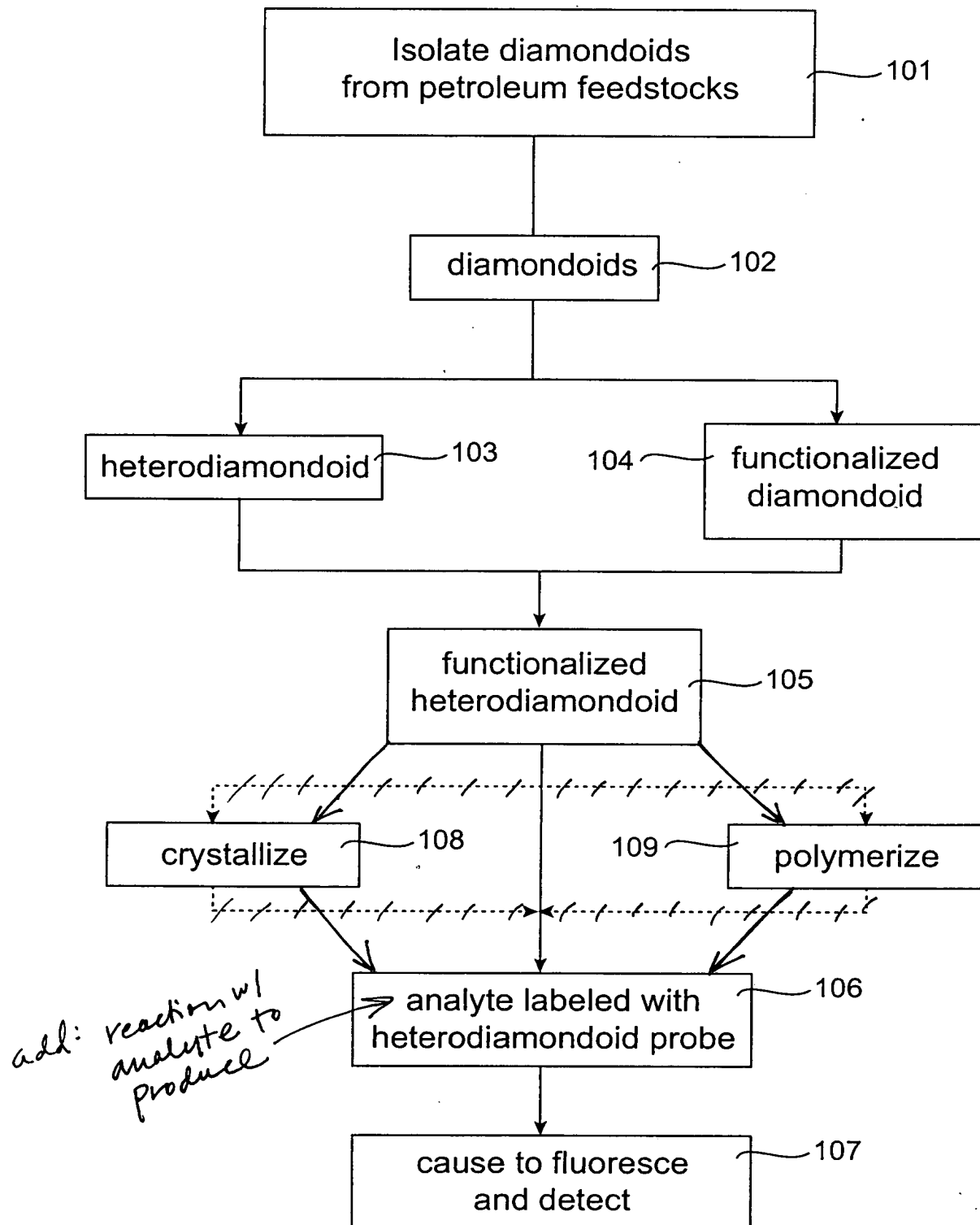


FIG. 1